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The revalidation of *Otostigmus* (*O.*) *lewisi* Song et al., 2005 (Scolopendromorpha, Scolopendridae) based on new material from Jiacha County, China

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Abstract

Otostigmus (*O.*) *lewisi* Song et al., 2005 was described from sub-adult specimens from Jiacha County (Xizang, China), but was synonymized by Lewis (2010) with the Nepalese species *O.* (*O.*) *beroni* Lewis, 2001. The latter was also recorded from Jilong County (Xizang, China) by Song et al. (2005). Following a comparison of *O.* (*O.*) *beroni* from Jilong County with new materials of *O.* (*O.*) *lewisi* from Jiacha County, we reaffirm that *O.* (*O.*) *lewisi* is a valid species.

Keywords

Centipede, *Otostigmus beroni*, *Otostigmus lewisi*, taxonomy, Tibet, Xizang

Introduction

The subgenus *Otostigmus* Porat, 1876 currently comprises about 56 species (Bonato et al. 2016; Niu et al. 2021). Among them, eight have been recorded in China (Song et al. 2005; Bonato et al. 2016; Niu et al. 2021): *O.* (*O.*) *aculeatus* Hasse, 1887,

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O. (*O.*) *astenus* (Kohlrausch, 1878), *O.* (*O.*) *beroni* Lewis, 2001, *O.* (*O.*) *lewisi* Song, Gai, Song & Zhu, 2005, *O.* (*O.*) *martensi* Lewis, 1992, *O.* (*O.*) *politus* Karsch, 1881, *O.* (*O.*) *scaber* Porat, 1876, and *O.* (*O.*) *xizangensis* Niu, Li & Di, 2021.

Otostigmus (*O.*) *lewisi* was identified as a synonym of *O.* (*O.*) *beroni* (Lewis 2010). According to the original description, *O.* (*O.*) *lewisi* has complete paramedian sutures on sternites 4–19, sternite 21 has a shallow medial longitudinal depression, and the coxopleural process is short. However, the sternite paramedian sutures in *O.* (*O.*) *beroni* are incomplete, and the coxopleural process is long. These differences were not shown in the corresponding figures of Song et al. (2005). Thus, Lewis (2010) wrote: "There are no significant differences between the two species and *O. lewisi* is a junior subjective synonym of *O. beroni*". We would also like to highlight that all type materials used in the Song et al. (2005) of *O.* (*O.*) *lewisi* were sub-adults.

Materials and methods

Studied materials were collected by hand and preserved in 75% ethanol. All studied materials in this paper were examined under a stereomicroscope (Motic K700). Photographs and measurements were taken using a Leica Stereomicroscope (M205 A). The standard terminology followed Bonato et al. (2010). The repository acronym is MHBU (Museum of Hebei University, Baoding, China).

Results

Order Scolopendromorpha Leach, 1814
Family Scolopendridae Leach, 1814
Subfamily Otostigminae Kraepelin, 1903
Genus *Otostigmus* Porat, 1876
Subgenus *Otostigmus* Porat, 1876

***Otostigmus* (*O.*) *beroni* Lewis, 2001**
Figs 1, 4C

Otostigmus beroni Lewis, 2001: 22; Lewis 2010: 26.

Material examined. Ar.-MHBU-SoJL1608050101–Ar.-MHBU-SoJL1608050120: Jilong Town, Jilong (Gyirong) County, Xizang (Tibet), China, 28.4370°N, 85.2568°E, 5/8/2016, leg. Zhiyong Di. Ar.-MHBU-SoJL21080101: Jilong Town, Jilong (Gyirong) County, Xizang (Tibet), China, 28.4350°N, 85.2570°E, 1/8/2021, leg. Zhiyong Di. Housed in MHBU.

Diagnosis. Maximum length 57 mm. Antennae 18 articles, the basal 2.25 to 2.40 glabrous dorsally (Fig. 1C, E). With 4 or 5 teeth (rarely 3) on each tooth plate,

the median 3 (or 4) ones more or less fused (Fig. 1D, E). Sternites with incomplete paramedian sutures occupying at least anterior 66 to 100% in mid and hind body region (Fig. 1G). Coxopleural process long, typically with 2 apical spines, 1–2 lateral spines and 1–2 dorsal spines (Fig. 1I). Ultimate prefemur with 4 rows of prominent spines, disposed on swollen bases (10–16 spines in total) (Fig. 1H, I).

Description (Ar.-MHBU-SoJL1608050101). ***Length*:** 54 mm (measured from anterior margin of cephalic plate to posterior margin of tergite 21).

Pigmentation (after remaining in alcohol for five years): body color yellow-brown; legs and antennae yellow; cephalic plate, tergites 1–2, tergites 20–21 and penultimate and ultimate legs blue-green (Fig. 1A, B). Live individual (Ar.-MHBU-SoJL21080101): cephalic plate blue-green, tergites blue-brown, penultimate legs and ultimate legs yellow with blue middle part in each segment, the other legs yellow (Fig. 4C).

***Cephalic plate*:** wider than long, rounded anteriorly, without sutures or sulci (Fig. 1C).

Figure 1. *Otostigmus* (*O.*) *beroni* Lewis, 2001 **A, B, G** Ar.-MHBU-SoJL1608050101 **C, D, F, H, I** Ar.-MHBU-SoJL1608050104 **E** Ar.-MHBU-SoJL1608050105 **A** dorsal view **B** ventral view **C** cephalic plate, antennae, tergite 1 and legs 1–2, dorsal view **D, E** ventral view of head, basal antennal articles, an arrow showing the profile of the tooth plate **F** tergites 16–19 **G** sternites 11–14 **H** last two segments and ultimate legs, dorsal view **I** last two segments and ultimate legs, ventral view. Scale bars: 10.0 mm (**A, B**); 2.0 mm (**C, F–I**); 1.0 mm (**D, E**).

***Antennae*:** 18 articles, basal 2.3 glabrous, the remainder are covered with short hairs (Fig. 1C, E).

***Forcipular segment*:** tooth plates with 4 teeth in each plate, the median 3 fused. Process of forcipular trochanteroprefemur with 3 teeth (Fig. 1D).

***Tergites (T)*:** with complete paramedian sutures from 3 to 20, marginate from 7 to 21 (Fig. 1F). Central part of the posterior border of T21 slightly convex (Fig. 1H).

***Sternites (S)*:** smooth, with incomplete paramedian sutures from 5 to 19 (Fig. 1G); S21 with a slight median longitudinal depression and converging posteriorly (Fig. 1I).

***Coxopleuron*:** with numerous small pores, coxopleural process moderately long and apical border with protuberance (Fig. 1I). With pore-free longitudinal strips within pore field. Coxopleural process with 2 apical spines, 2 lateral spines, and 1–2 dorsal spines.

***Legs (L)*:** L1–16 and L18–19 with 2 tarsal spurs, L1–4, left L5 and right L6 with 1 tibial spur and L1 with 1 femoral spur.

Ultimate prefemur with 4 ventro-lateral, 2 ventro-medial, 3 medial, 2 dorso-medial spines and 1 corner spine (Fig. 1H, I).

Variability. There are multiple differences among individuals as addressed below. The number of teeth of forcipular tooth plates 4+4 (11 specimens), 5+5 (6 specimens), 3+3 (2 specimen) or 3+4 (2 specimens). Coxopleural process with 4–7 spines (2 apical spines, 1–2 lateral spines and 1–3 dorsal spines). One tibial spur on L1–4 (8 specimens), L1–5 (5 specimens), L1–2 (2 specimens), L1–3 (3 specimens), or L1–6 (2 specimens). Two tarsal spurs on 1 to 18 or 19 pairs of legs; 1 tarsal spur on subsequent to penultimate legs. Ultimate legs without tarsal spur. Ultimate legs prefemur with 11–14 spines (4 or 5 ventro-lateral, 1–3 ventro-medial, 3 or 5 medial and 1 or 2 dorso-medial and 1 corner spine, rarely 0 or 3 corner spines) (Table 1).

Habitat. Found under stones in humid mountain bush (Fig. 4A).

Distribution. China (Xizang) and Nepal (Fig. 5).

Otostigmus (*O.*) *lewisi* Song, Gai, Song & Zhu, 2005 (Revalidated name)

Figs 2, 3, 4D

Otostigmus lewisi Song et al, 2005: 304.

Material examined. Ar.-MHBU-SoJC1908060301– Ar.-MHBU-SoJC1908060307: Jiacha County (Gyaca County), Xizang (Tibet), China, 29.0857°N, 92.3430°E, 6/8/2019, leg. Zhiyong Di. Ar.-MHBU-SoJC1608DX01: Jiacha County, Xizang, China, 29.1188°N, 92.6969°E, 12/8/2016, leg. Zhiyong Di. Ar.-MHBU-SoJC1608120401: Jiacha County, Xizang, China, 29.1387°N, 92.6880°E, 12/8/2016, leg. Zhiyong Di. Housed in MHBU.

Diagnosis. Maximum length 77 mm. Antennae 17–20 articles, basal 2.2–3 glabrous dorsally (Fig. 2C, F). With 3 or 4 teeth on each tooth plate, the median two more or less fused (Figs 2F, 3C). Sternites with paramedian sutures. Coxopleural process typically with 2 apical spines, 1–2 lateral spines and 1–2 dorsal spines (Figs 2H, 3D).

Table 1. Variation in *O.* (*O.*) *beroni* from Jilong County, Xizang (1: Ar.-MHBU-SoJL1608050101; 2: Ar.-MHBU-SoJL1608050102; 3: Ar.-MHBU-SoJL1608050103; 4: Ar.-MHBU-SoJL1608050104; 5: Ar.-MHBU-SoJL1608050105) (L/R: Left/Right).

		Specimens				
		1	**2**	**3**	**4**	**5**
Length/mm		54	43	47	57	39
Number of antennal articles (L/R)		18/19	18	18	18	18
Number of glabrous basal antennal articles		2.3	2.3	2.4	2.4	2.3
Tooth-plate teeth		4+4	4+4	5+5	4+4	5+5
Paramedian sutures on tergites		3–20	4–20	4–20	3–20	4–20
Tergites marginate		6–21	6–21	7–21	7–21	6–21
Paramedian sutures on sternites		5–19	7–19	7–19	7–19	6–19
Coxopleural process	Apical spines (L/R)	2/3	2	2	2	2
	Dorsal spines (L/R)	1/2	1	3	2	2/1
	Lateral spines (L/R)	1/2	2	2	2/1	2
Legs	With tibial spur	1–4	1–2	1–5	1–4	1–3
	With 1 tarsal spur	17, 20	20	20	20	20
	With 2 tarsal spurs	1–16, 18–19	1–19	1–19	1–19	1–19
Spines of ultimate prefemur	Ventro-lateral (L/R)	4	5/4	4	4	5/4
	Ventro-medial (L/R)	2	1/2	2	2/3	2
	Medial (L/R)	3	5/3	3	3/5	3
	Dorso-medial (L/R)	2	2	2	2	2/1
	Corner spine (L/R)	1	3/1	1	1/0	1
Femoral spur of leg 1		0	0	1	1	1

Ultimate prefemur with 4 rows of prominent spines, disposed on swollen bases (7–19 in total) (Fig. 2E, H).

Remarks. The *O.* (*O.*) *lewisi* holotype described in Song et al. (2005) was as follows (Song et al. 2005; Lewis 2010): 18 articles, with the basal 2.5–2.7 glabrous dorsally; with 3 teeth on each tooth plate, the inner two ones more or less fused; tergites with complete paramedian sutures from 5; marginate from S6 to S8, without keels or spines; sternites with complete paramedian sutures from 4 to 19; last sternite with sides converging caudally, posterior edge strongly concave, and central longitudinal depression; coxopleural process short, typically with 2 apical spines, 2 lateral spines and one dorsal spine; ultimate prefemurs with prominent spines on swollen bases.

Following Song et al. (2005), Lewis (2010) considered that there were minor differences between *O.* (*O.*) *lewisi* and *O.* (*O.*) *beroni*; however, the description and figures of *O.* (*O.*) *lewisi* were not consistent in Song et al. (2005), as the authors mistakenly reused the figures of *O.* (*O.*) *martensi* (Song et al. 2005: figs 34–40) for *O.* (*O.*) *lewisi* (Song et al. 2005: figs 47–53). This can be verified by checking the information of *O.* (*O.*) *lewisi* (Song 2004: 58–59, fig. 42) and *O.* (*O.*) *martensi* (Song 2004: 57, fig. 40) provided in Song's unpublished thesis.

Song et al. (2005) recorded that *O.* (*O.*) *lewisi* is similar to *O.* (*O.*) *beroni*, and distinguished *O.* (*O.*) *lewisi* from the latter by the length of coxopleural process and the shape of the ultimate sternite. Because Lewis (2010) didn't refer to the unpublished thesis of Song (2004), the misleading figures of *O.* (*O.*) *lewisi* in Song et al. (2005)

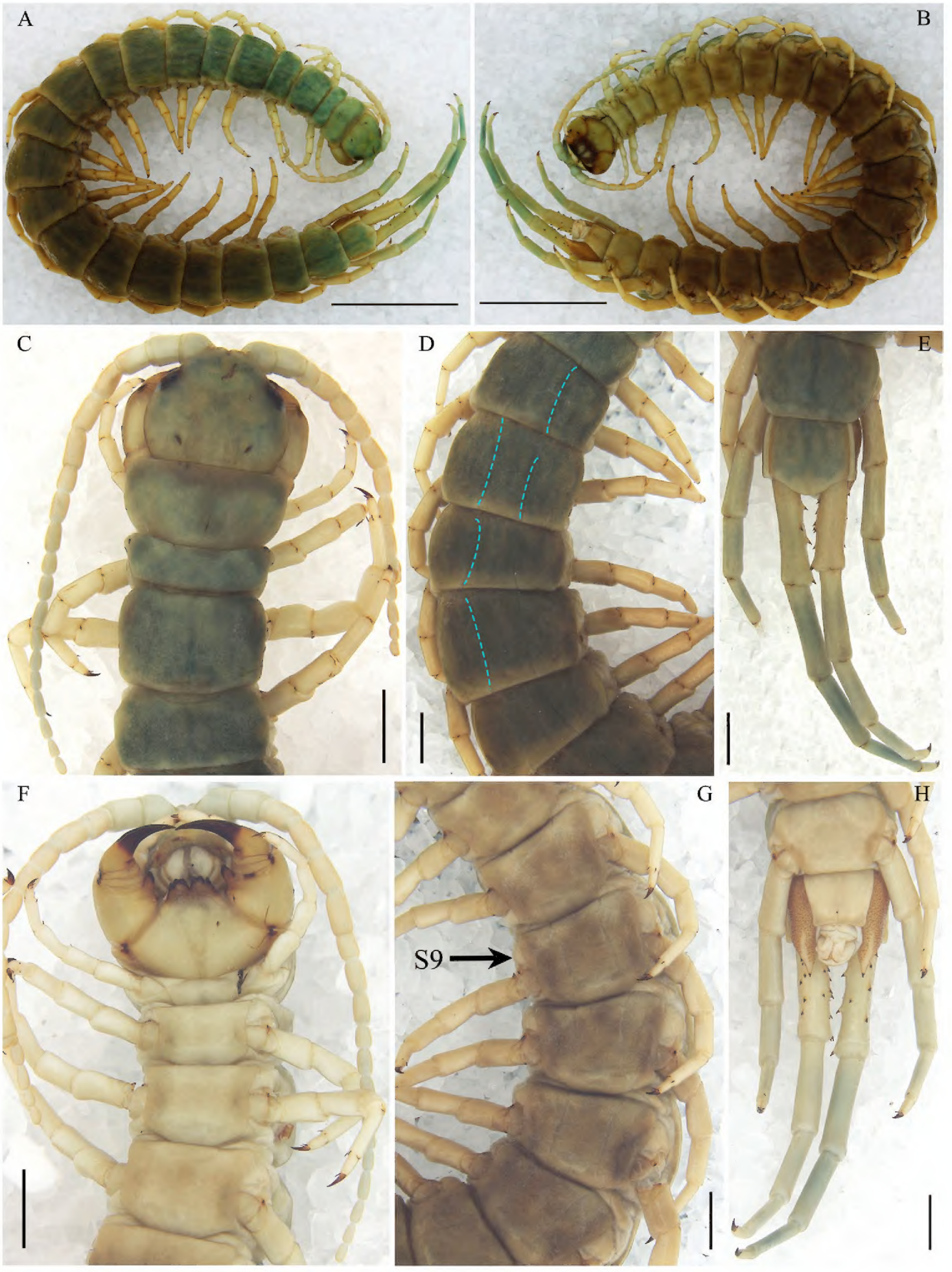

Figure 2. *Otostigmus* (*O.*) *lewisi* Song et al., 2005. (Ar.-MHBU-SoJC1908060301): **A** dorsal view **B** ventral view **C** cephalic plate, antennae and tergites 1–4, dorsal view **D** tergites 7–11 **E** last two tergites and ultimate legs, dorsal view **F** head, antennae, sternites 1–4 and teeth on tooth plates 3+3, ventral view **G** sternites **H** last two sternites and ultimate legs, ventral view. Scale bars: 10.0 mm (**A, B**); 2.0 mm (**C–H**).

led Lewis to conclude that there are no significant differences between the two species and that *O.* (*O.*) *lewisi* is a junior subjective synonym of *O.* (*O.*) *beroni* (Lewis 2010).

The characteristics of the holotype of *O.* (*O.*) *lewisi* reported by Song (2004) and Song et al. (2005) are same to the new immature materials examined in this paper. Therefore, we considered that all the type materials of *O.* (*O.*) *lewisi* described previously were sub-adults.

Description (Ar.-MHBU-SoJC1908060301). *Length*: 70 mm (measured from anterior margin of cephalic plate to posterior margin of tergite 21).

Pigmentation (after remaining in alcohol for two years): cephalic plate and tergites yellow with light green; antennae and legs yellow; penultimate legs and ultimate legs green (Fig. 2A, B). Live individual (Ar.-MHBU-SoJC1608DX01): antennae light blue mainly, cephalic plate and tergites brownish, penultimate legs and ultimate legs yellow with blue middle part in each segment, the rest of the legs yellow (Fig. 4D).

***Cephalic plate*:** wide 3.86 mm, long 3.18 mm, rounded anteriorly, without sutures or sulci (Fig. 2C).

***Antennae*:** with 17 articles on the right and 19 on the left antenna, basal 2.5 glabrous, the remainder covered with short, tapering, yellowish hairs (Fig. 2C, F).

***Forcipular segment*:** forcipular tooth plates present, with 3 teeth on each plate, the median two fused, their basal sutures form right angle, process of forcipular trochanteroprefemur well developed (Fig. 2F).

***Tergites (T)*:** with complete paramedian sutures from 4 to 20; marginate from 6 to 21 (Fig. 2D); the posterior border of T21 slightly convex (Fig. 2E).

***Sternites (S)*:** smooth, with incomplete paramedian sutures from 3 to 4, complete paramedian sutures from 5 to 19 (Fig. 2G); S21 with a slight median longitudinal depression and converging posteriorly (Fig. 2H). Central part of the posterior border of S21 slightly concave.

***Coxopleuron*:** pore field with numerous pores, coxopleural process moderately long and apical border with protuberance. With pore-free longitudinal strip in pore field. Coxopleural process with 2 apical spines, 1 lateral spine and 1–2 dorsal spines (Fig. 2H).

***Legs (L)*:** L2–9, right L11 and left L12 with 2 tarsal spurs; 1 tarsal spur on subsequent to penultimate legs; L1 and left L2 with 1 tibial spur and right L1 with 1 femoral spur.

The left prefemur with 1 corner spine, 3 ventro-lateral spines, 1 ventro-medial spines, 2 medial spines, 1 dorso-medial spine; the right prefemur with 2 corner spines, 5 ventro-lateral spines, 2 ventro-medial spines, 7 medial spines, 3 dorso-medial spines (Fig. 2E, H).

Variability. Adult and juvenile individuals differ primarily in body length and pigmentation (Figs 2A, B, 3A, B). There are differences among individuals as described below. Antennal articles 17–20. The number of teeth of forcipular tooth-plates 3+3 (5 specimens) (Fig. 2F) or 4+4 (the lateral one with a small tooth on its lateral side) (4 specimens) (Fig. 3C). Tergites with paramedian sutures from 3 (3 specimens) or

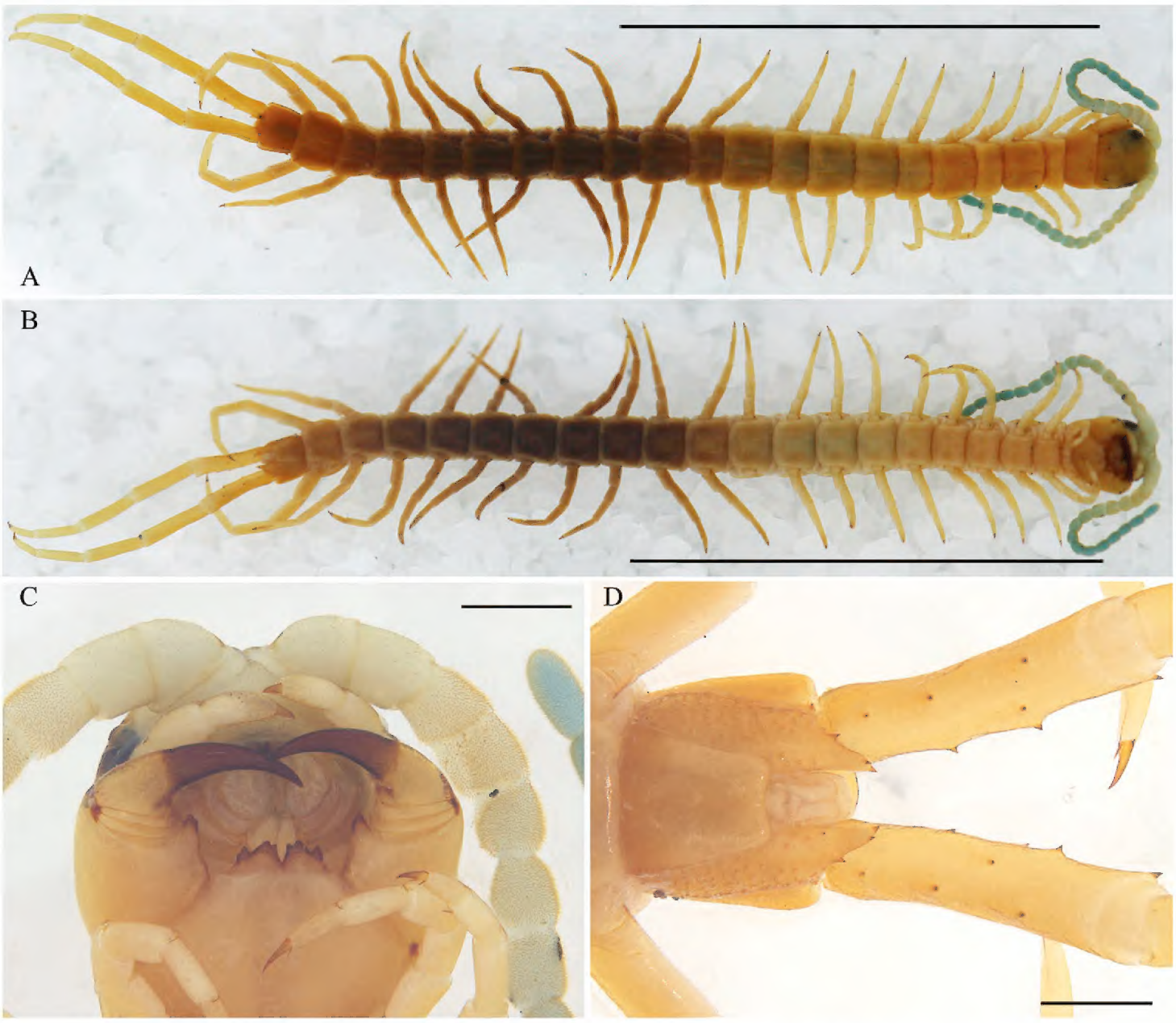

Figure 3. *Otostigmus (O.) lewisi* Song et al., 2005. (Ar.-MHBU-SoJC1908060304): Juvenile individual **A** dorsal view **B** ventral view **C** the ventral view of head, antennae and teeth on tooth plates 3+3 (the medial two teeth fused, the lateral one with a small tooth on its lateral side) **D** sternite 21, coxopleuron and prefemur of ultimate legs, ventral view. Scale bar: 10.0 mm (**A, B**); 0.5 mm (**C, D**).

4 (5 specimens), from 6 (1 specimen), marginate from 3–8. Sternites with paramedian sutures from 2 (4 specimens), 3 (4 specimens) or 4 (1 specimen). Coxopleuron process with 4–6 spines (2 apical spines, 1–2 lateral spines and 1–2 dorsal spines). One tibial spur on L1–2 (6 specimens) or only L1 (3 specimens). The number of tarsal spurs on legs has no regularity. Two tarsal spurs on L1(2)–9 (4 specimens), L1–12(13) (3 specimens), L1–16 and L18 (1 specimen) or L1,3,5–6&8–15 (1 specimen). One tarsal spur on subsequent to penultimate legs. Ultimate legs without tarsal spur. Ultimate leg prefemur with 8–11, rarely 18 or 19 spines (2–5 ventro-lateral, 1–2 ventro-medial, 2–4 or 7 medial and 1–3 or 6 dorso-medial and 1 corner spine, rarely 2 corner spines) (Table 2).

Habitat. Found under stones in arid mountain bush (Fig. 4B).

Distribution. China (Xizang) (Fig. 5).

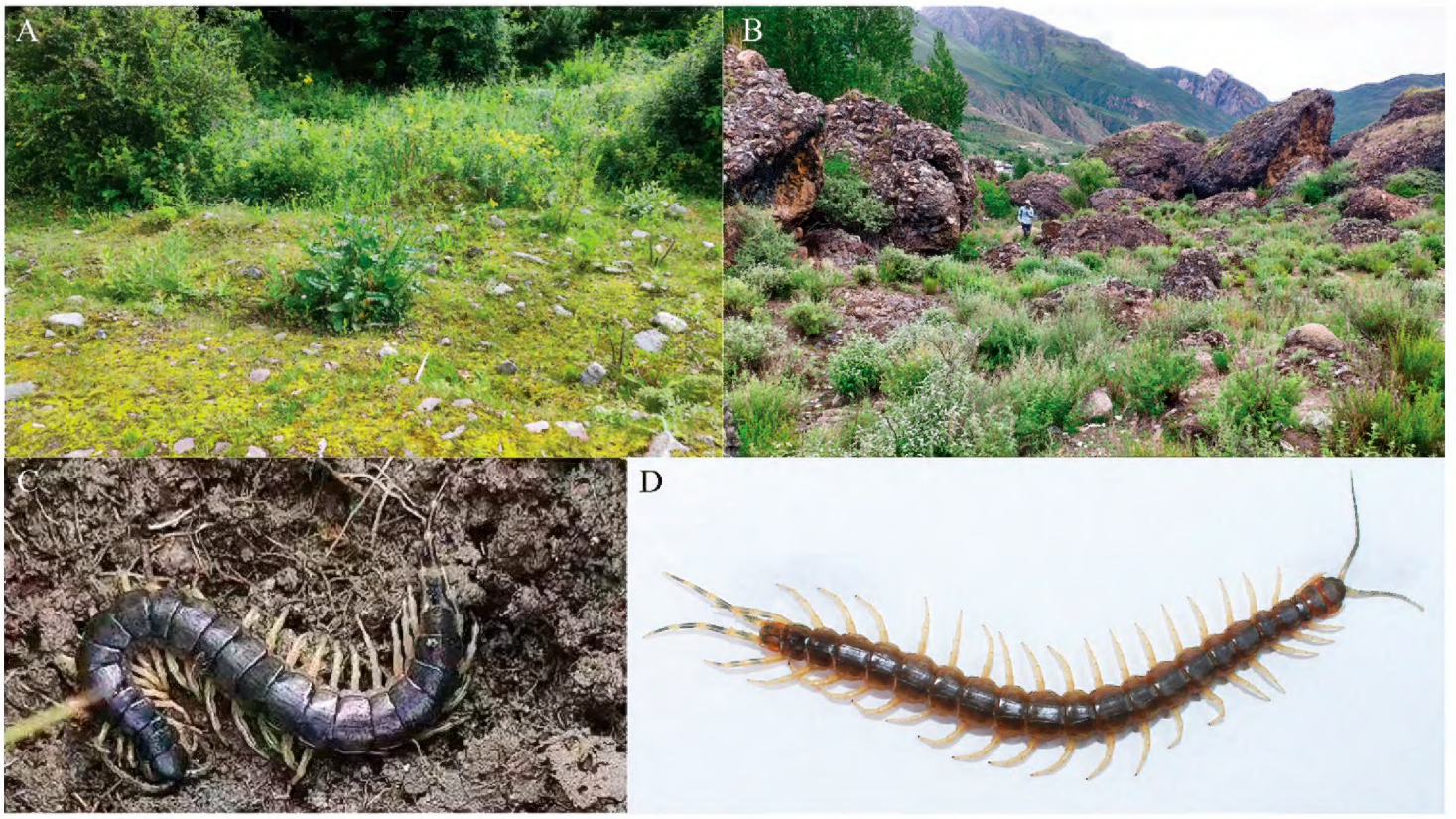

Figure 4. A habitat of *O.* (*O.*) *beroni* in Jilong Town, Jilong County **B** habitat of *O.* (*O.*) *lewisi* in Anrao Town, Jiacha County **C** *O.* (*O.*) *beroni* (Ar.-MHBU-SoJL21080101) **D** *O.* (*O.*) *lewisi* (Ar.-MHBU-SoJC1608DX01).

Table 2. Variation in *O.* (*O.*) *lewisi* from Jiacha County, Xizang (0302: Ar.-MHBU-SoJC1908060302; 0303: Ar.-MHBU-SoJC1908060303; 0304 (Fig. 3): Ar.-MHBU-SoJC1908060304; DX01: Ar.-MHBU-SoJC1608DX01; 0401: Ar.-MHBU-SoJC1608120401) (L/R: Left/Right).

		Specimens				
		DX01	**0302**	**0303**	**0401**	**0304**
Length/mm		77	28	53	28	20
Number of antennal articles (L/R)		18/20	17	18/20	18	17
Number of glabrous basal antennal articles		2.25	3	2.3	3	2.2
Tooth-plate teeth		3+3	4+4*	3+3	3+3	4+4*
Paramedian sutures on tergites		4–20	3–20	3–20	6–20	4–20
Tergites marginate		7–21	4–21	8–21	3–21	5–21
Paramedian sutures on sternites		3–19	2–19	4–19 (4–9#)	3–19 (3–5#)	2–19 (2–4#)
Coxopleural process	Apical spines (L/R)	2	2	2	2	2
	Dorsal spines (L/R)	2	1	1/2	1	1
	Lateral spines (L/R)	2	2	2	1	1
Legs	With tibial spur	1–2	1–2	1	1	1–2
	With 1 tarsal spur	2,4,7,17,18	13–20	13–20	10–12,15–20	1,10–20
	With 2 tarsal spurs	1,3,5,6,8–15	1–12	1–12	1–9,13,14	2–9
Spines of ultimate prefemur	Ventro-lateral (L/R)	2	4/3	3	3/2	3
	Ventro-medial	1	1	1	1	1
	Medial (L/R)	2	2	3/2	2	2
	Dorso-medial (L/R)	2	3/2	2/3	2	1
	Corner spine	1	1	1	1	1
Femoral spur of leg 1		1	1	1	1	0

* Medial two teeth fused, lateral one with a small tooth on its lateral side (Fig. 3C).

Sternites with incomplete paramedian sutures.

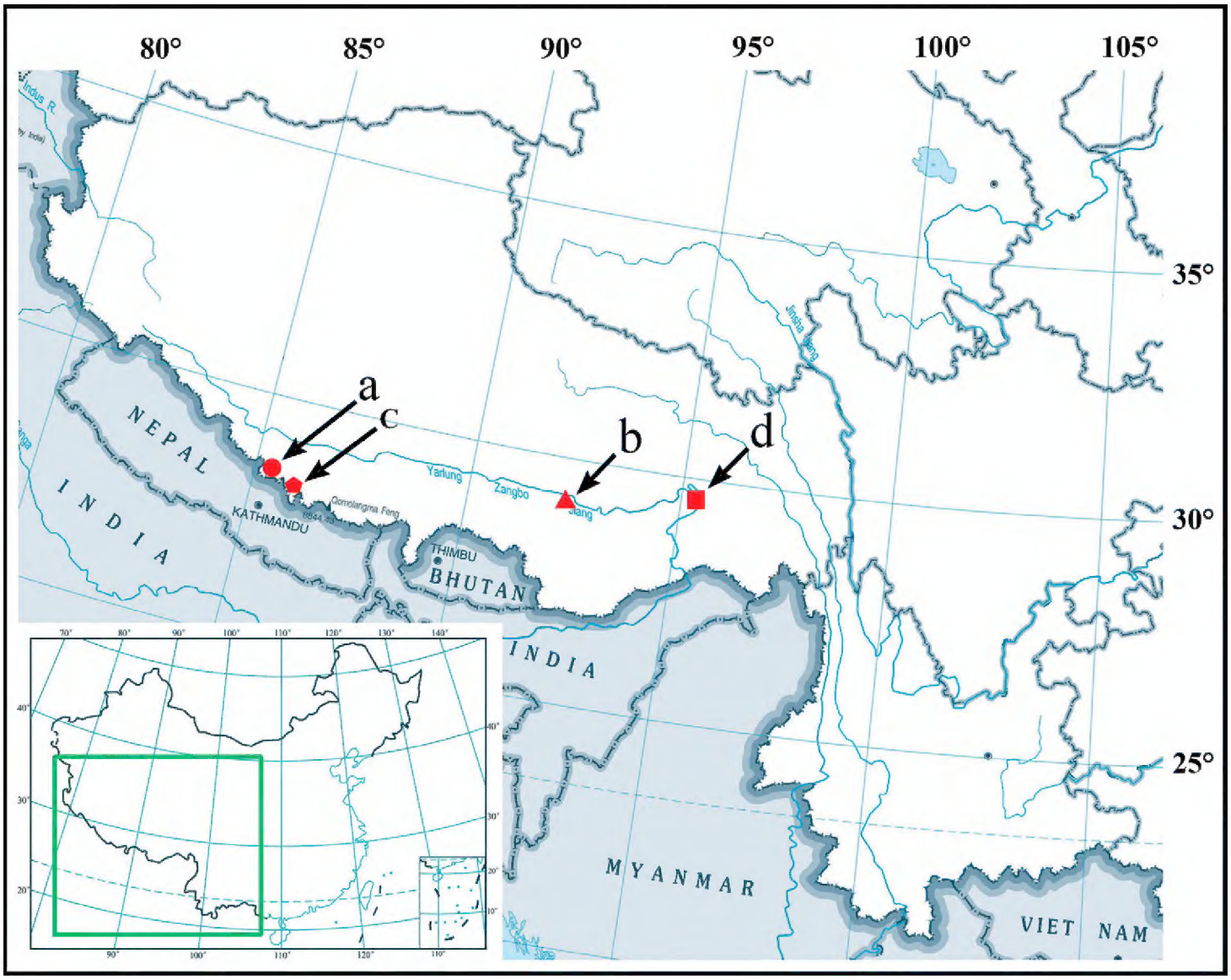

Figure 5. Distributions of *Otostigmus* in Xizang, China **a** circle – *O.* (*O.*) *beroni*, Jilong Town, Jilong (Gyirong) County **b** triangle – *O.* (*O.*) *lewisi*, 2005, Jiacha (Gyaca) County **c** pentagon – *O.* (*O.*) *martensi*, Nielamu (Nyalam) County **d** square – *O.* (*O.*) *xizangensis*, Bomi (Bome) County.

Discussion

Only four species of the genus *Otostigmus*, namely, *O.* (*O.*) *beroni*, *O.* (*O.*) *lewisi*, *O.* (*O.*) *martensi* and *O.* (*O.*) *xizangensis*, were reported in Xizang, China (Fig. 5), geographically away from other species distributed throughout China. *Otostigmus* (*O.*) *lewisi* can be easily distinguished from *O.* (*O.*) *beroni* using the following characteristics: (1) larger average body length: 73 mm in *O.* (*O.*) *lewisi* (average of 2 adults), versus 48 mm in *O.* (*O.*) *beroni* (average of 5 adults); (2) body color (live): primarily brownish cephalic plate and tergites in *O.* (*O.*) *lewisi*, and blue-green cephalic plate and blue-brown tergites in *O.* (*O.*) *beroni* (Fig. 4C, D); (3) the number of teeth of tooth plates: *O.* (*O.*) *lewisi* 3+3 in 5 specimens or 4+4 in 4 specimens versus *O.* (*O.*) *beroni* 4+4 in 11 specimens or 5+5 in 6 specimens; (4) the number of tibial spurs on legs: *O.* (*O.*) *lewisi* with one tibial spur on legs 1–2 in 6 specimens or on legs 1 in 3 specimens. In contrast, *O.* (*O.*) *beroni* with one tibial spur on legs 1–4 in 8 specimens or 1–5 in 5 specimens; (5) the number of tarsal spurs on legs: *O.* (*O.*) *lewisi* with 2 tarsal spurs on legs 1(2)–9(13), with no regularity. In *O.* (*O.*) *beroni*, however, 2 tarsal spurs on legs 1–18(19); (6) the length of coxopleural process: coxopleural process of *O.* (*O.*) *lewisi* is

shorter than that of *O.* (*O.*) *beroni*. The specimens described by Song et al. (2005) were immature (22–56 mm), which eventually led to a later revision by Lewis.

The most geographically close species of this genus in Xizang, China are *O.* (*O.*) *beroni* and *O.* (*O.*) *martensi*. The main difference between *O.* (*O.*) *beroni* and *O.* (*O.*) *martensi* are as follows: (1) the number of teeth of tooth plates: *O.* (*O.*) *martensi* 3+3, whereas, *O.* (*O.*) *beroni* 4+4 or 5+5; (2) the number of spines on the coxopleural process: *O.* (*O.*) *martensi* coxopleural process with 1 apical spine, 1 lateral spine and 1 dorsal spine. In contrast, *O.* (*O.*) *beroni* coxopleural process with 2–3 apical spines, 1–2 lateral spines, and 1–2 dorsal spines; (3) spurs on legs: *O.* (*O.*) *martensi* L1–4 or 5 with 2 tarsal spurs, whereas *O.* (*O.*) *beroni* L1–19 with 2 tarsal spurs, L20 with 1 tarsal spur (Lewis 2001; Song et al. 2005; Lewis 2010). Given this evidence, *O.* (*O.*) *lewisi* and *O.* (*O.*) *martensi* are obviously different species.

The distance between Jilong Town (the locality of *O.* (*O.*) *beroni* in China) and Zhangmu Town (Nyalam County, the locality of *O.* (*O.*) *martensi* in China)) is about 78 km, and the distance between Jilong Town and Jiacha County (the locality of *O.* (*O.*) *lewisi* in China) is about 714 km. No species of the genus *Otostigmus* was found in the area between Jilong Town (or Zhangmu Town) and Jiacha County. The habitat of *O.* (*O.*) *beroni* in Jilong Town is more humid than the habitat of *O.* (*O.*) *lewisi* in Jiacha County (Fig. 4A, B). Based on newly collected materials from Jiacha County, we reaffirm that *O.* (*O.*) *lewisi* is a valid species.

Key to species of *Otostigmus* from China (followed Lewis 2001; Song et al. 2005; Niu et al. 2021)

1	Ultimate sternite with sides more or less parallel	***O. (O.) astenus***
–	Ultimate sternite with sides converging posteriorly	**2**
2	Tergites typically with keel	**3**
–	Tergites typically without keel	**4**
3	Antennae with 17–19 articles	***O. (O.) xizangensis***
–	Antennae with 21 articles	***O. (O.) scaber***
4	Coxopleural process short, coxopleuron completely covered with pores	***O. (O.) politus***
–	Coxopleural process moderate or long, coxopleuron incompletely covered with pores	**5**
5	Coxopleural process with 4–7 apical spines, ultimate leg with 24–36 spines	***O. (O.) aculeatus***
–	Coxopleural process with less than 4 apical spines, ultimate leg with less than 24 spines	**6**
6	Coxopleural process with only 1 apical spine	***O. (O.) martensi***
–	Coxopleural process with 2 apical spines	7
7	Legs 1–4 or 5 with tibial spur, legs 1–19 with 2 tarsal spurs, leg 20 with 1 tarsal spur	***O. (O.) beroni***
–	Legs 1–2 with tibial spur, the distribution of 2 tarsal spurs in legs without regularity	***O. (O.) lewisi***

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